





NASA General Aviation Research National General Aviation Roadmap Small Aircraft Transportation System



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Outline





The Golden Rule of the information age is "Time is the Scarce Commodity."

Early in the 21st century, the demand for personal transportation will soar beyond supply.

The Millennial Opportunity: SATS creates more time for more people.

SATS Concept
Community-Driven Opportunities
National Strategies

The Administration's 2001 Budget





"Among other programs, Langley will see new funds directed to the "Small Aircraft Transportation" Program, which will fundamentally change our future air transportation system for both business and personal air travel. The small aircraft transportation program will enable travel for the public at their convenience--any time, any where to over 4,000 airports--not the 400 airports used today with our over crowded hub and spoke system--and we'll do it with the same level of safety of today's commercial jet transport aircraft."

Senator Charles Robb (VA) at NASA Langley Research Center January 7, 2000

Solving 21st Century Transportation Challenges





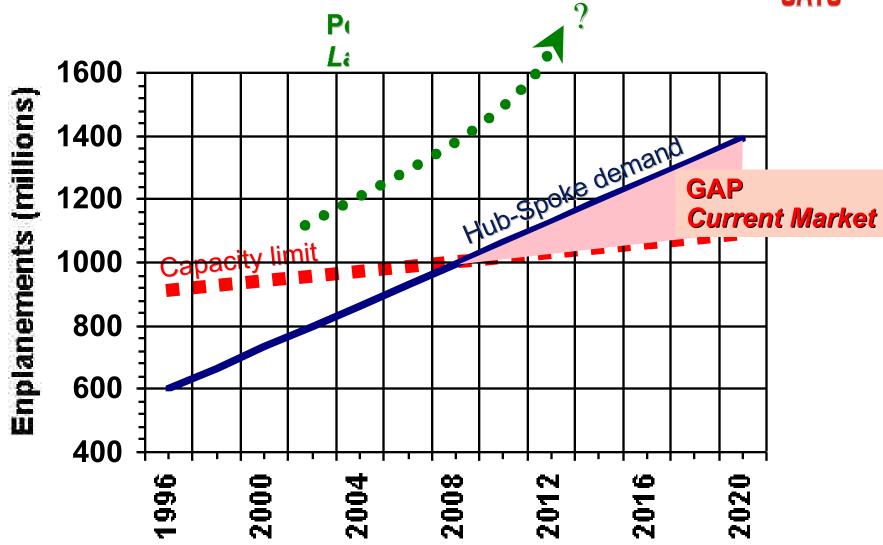
The Small Aircraft Transportation System is a safe travel alternative, freeing people and products from transportation delays, by creating access to more communities in less time.

Demand Will Soon Exceed Supply

...not even considering pent-up travel demand...





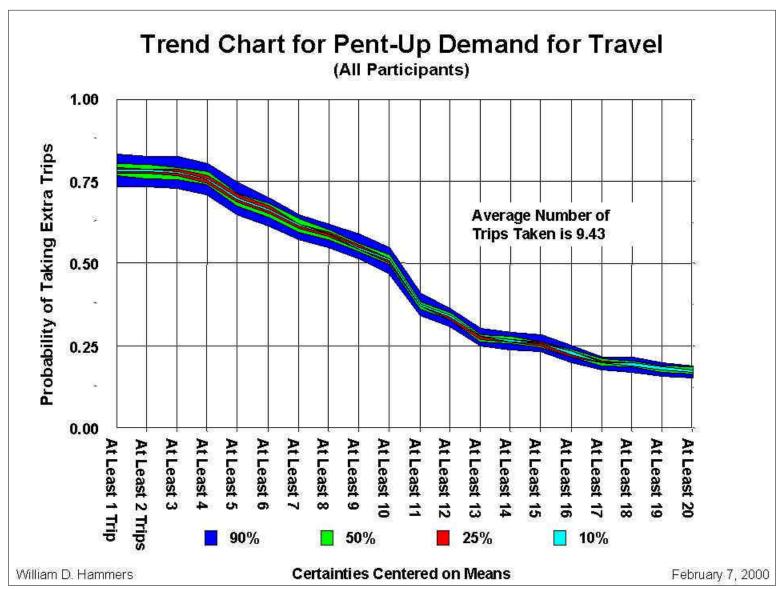


Pent-up Demand (http://apats.org)

"How many more trips would you take annually if you could save time?"



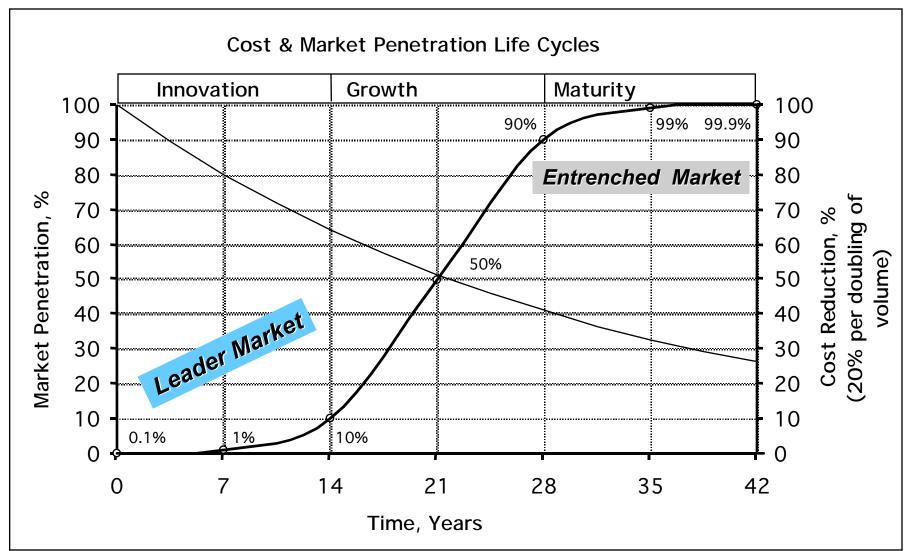




Innovation and Cost Life Cycles



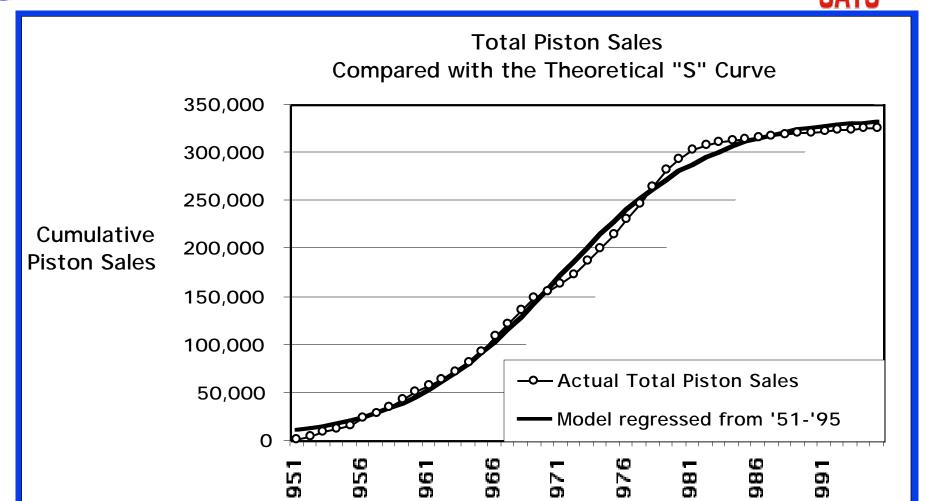




Life Cycle of the Piston Aircraft Market

...or is it really?...





Year

Itzhak Gartenberg, Yale University

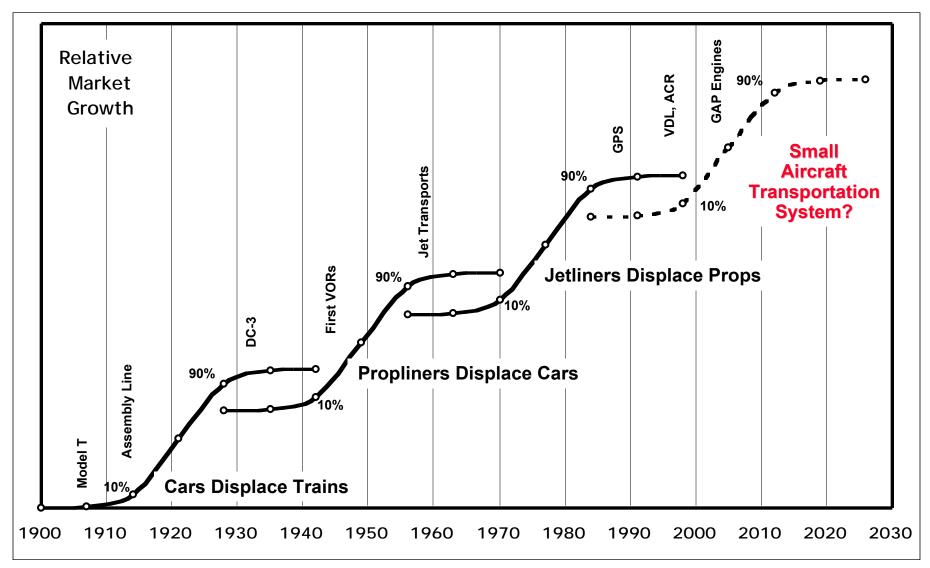
Langley Aerospace Research Summer Scholar, 1999

(R)evolutions in Higher Speed Travel

What is Next? More Speed to More Destinations





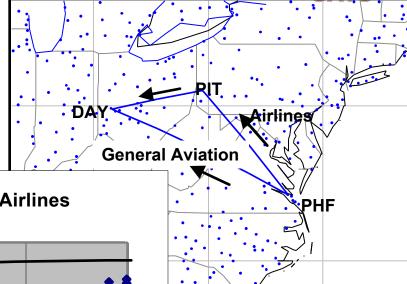


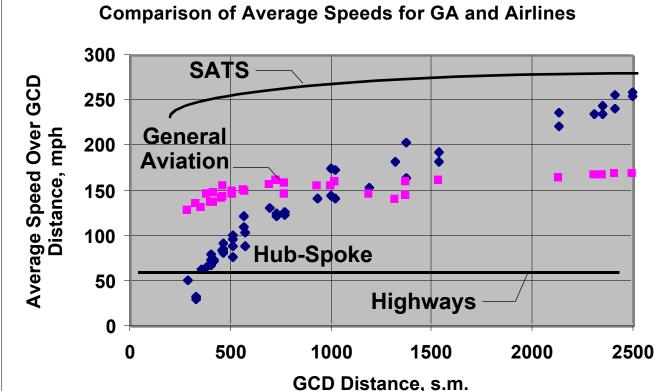
Small Aircraft Transportation System Mobility

"...doorstep-to-destination at four times the speed of highways..."



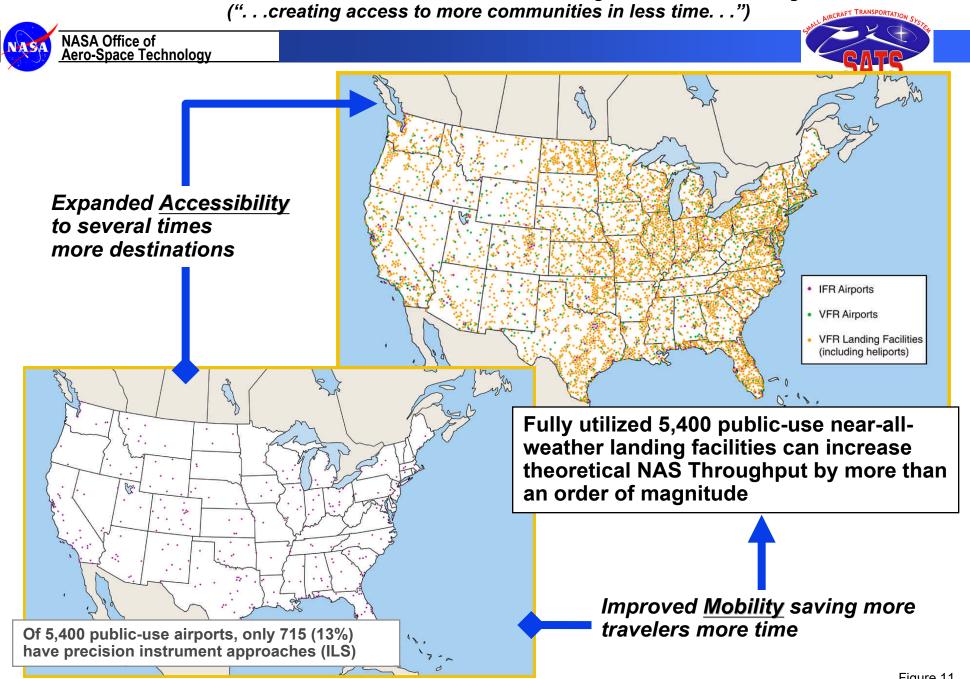
SATS reduces travel times, while highways and Hub-and-spoke travel times will continue to increase.





- Hub-Spoke: OAG times for 28 destinations
- General Aviation: timeoptimized flight plans
- Including intermodal penalties (:45 +:45 for airline & :30+:30 for GA departure & arrivals)
- No GA destination benefit (for proximity of airports)
- SATS with new GAP engines: costs equal current General Aviation at 2 times the speed.

SATS Increases Accessibility and Mobility



The Next Generation Cockpits and Aircraft





Lancair Columbia 300



21st Century Propulsion



Cirrus SR-20

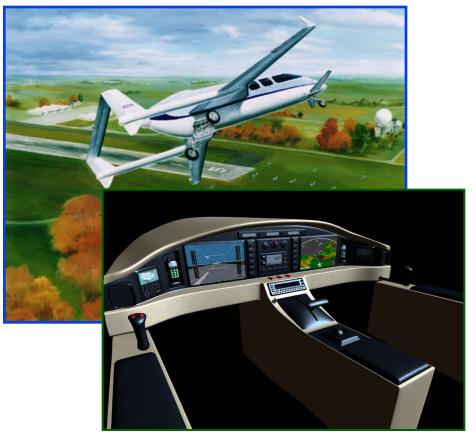


and Others....

Coming Soon to an airport near you!

Precision Guidance to Every Runway End in America

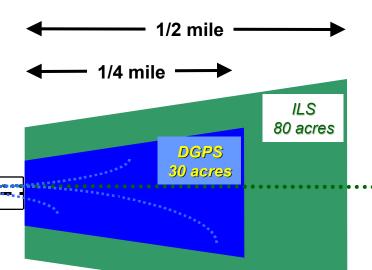




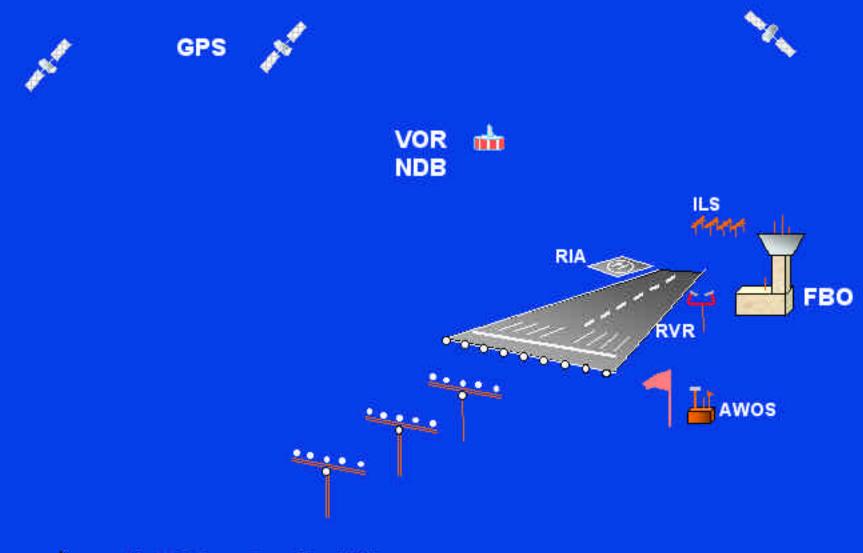
Highway in the Sky / Synthetic Vision with "Virtual" Approach Procedures:

- Saves land
- Limits noise
- Increases safety

Runway Protection Zone (RPZ)



GA Landing Facilities: Past and Future



2000

18,000 Landing Facilities

5,400 Public Use

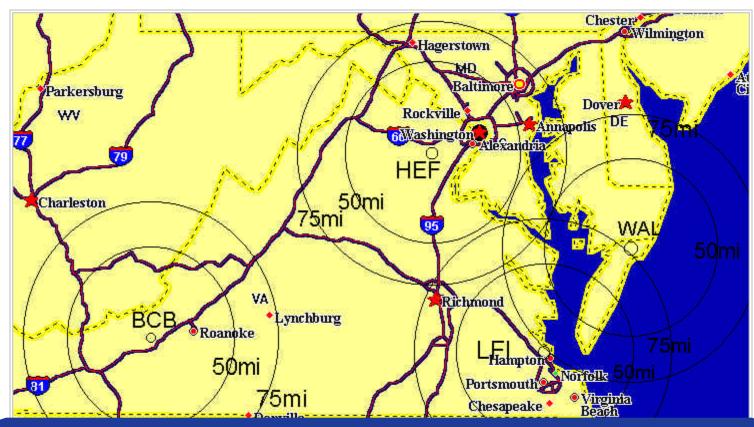
GA Landing Facilities: Past and Future



Virginia SATSLab







- Highway in the Sky (HITS) Precision Guidance to All Runway Ends
- Satellite-based Airborne Internet, Client-Server architecture
- VFR 20:1 Approach Zones in IMC using "Virtual" TerPs
- Towerless, Radarless Operations with self-sequencing & separation

SATSLab Demonstration Scenario Designs





20:1 RPZ Approaches

- What approach and landing minima apply when using synthetic vision with Highway in the Sky operations?
- What lighting requirements apply when using synthetic vision with Highway in the Sky operations?
- How many aircraft can simultaneously operate in a non-towered, nonradar airspace?
- Under what conditions can Terminal Procedures (TerPs) be "virtual" (*l.e.*, computed on-board in real-time)?
- When should the Server versus the Client make separation & sequencing decisions?
- What are the impacts of emergencies on equipage and procedures?
- How can intersecting runways be used in "Virtual" VMC?
- How much of the visual segment of the approach can be presented in "virtual" computer graphics, versus actual out the window transition?



SATSLab Demonstration Scenario Designs





Simultaneous Non-Interfering Approaches

- What mix of procedures and equipage will allow for SNI?
- Under what conditions will SNI work with Land and Hold Short operations?
- What are the impacts of emergencies on equipage and procedures?
- What approach and landing minima apply when using synthetic vision with Highway in the Sky for SNI operations?
- What procedures and equipage will allow for transient corridors in Class B airspace for SNI?



SATSLab Demonstration Scenario Designs





SATS EnRoute

- What procedures and equipage will permit dynamic access through Special Use Airspace without voice communication?
- What limits in routing and altitude segments can be pilot-controlled?
- What are the impacts of emergencies on equipage and procedures?
- When should the Server versus the Client make separation & sequencing decisions?



